August 26, 1961

VOL. 80, NO. 9 PAGES 133-144

SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE

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A SCIENCE S PUBLICATION

BIOCHEMISTRY

Earth Once Glowed

➤ THE EARTH'S SURFACE in its early years of life may have glowed like a beautiful rainbow, shimmering with the colorful array of light emitted by primitive organisms.

Light emission may have occurred soon after life appeared on earth, when the atmosphere lacked oxygen, Drs. W. D. McElroy and H. H. Seliger of Johns Hopkins University, Baltimore, Md., reported at the International Congress on Biochemistry in Moscow.

As small amounts of oxygen appeared in the atmosphere, not all of the organisms could tolerate the presence of oxygen. However, those that could quickly and rapidly remove the oxygen by reduction with hydrogen or electrons from primitive foodstuffs survived.

In removing the oxygen by the use of organic reducing substances, an excited state was produced resulting in the emission of light. The surviving organisms were therefore all potentially luminescent. Thus began the oxygen-using metabolism evident in most present day organisms.

After the aerobic system became well established the luminescent systems no longer had a selective advantage. Nevertheless they continued to exist and are now found in certain bacteria, fungi and the firefly.

The compound that makes the firefly glow, luciferin, was recently synthesized for the first time by Dr. McElroy and three other scientists at Johns Hopkins University. The firefly's luminescent system was adapted for a secondary purpose, the identification of the female firefly by the male.

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Photosynthesis Studied

➤ PHOTOSYNTHESIS—the conversion of light into energy by living cells—is not as simple as that observed in green plants.

By isolating the photosynthetic process from the complex living cell, scientists have found that the process is independent of oxygen and more closely linked with absorbing phosphorus. Scientists normally view photosynthesis in plants as converting carbon dioxide to sugars while giving off oxygen to the air.

Photosynthetic cells are distinguished from other cells by their ability to form two products from light energy, ATP (adenosine triphosphate) and PNH-2 (reduced pyridine nucleotide). The formation of these products is largely responsible for converting carbon dioxide to sugars. The reaction is accompanied by the evolution of oxygen, which to the casual observer seems to require more light energy.

It is these outward reactions that have resulted in the popular definition of photosynthesis.

University of California scientists in Berkeley carried on cell-free photosynthetic experiments by removing chloroplasts from spinach leaves. Chloroplasts are tiny particles of green leaves that contain the chlorophyll pigments where photosynthesis takes place.

The results of the experiments were presented to the International Congress on Biochemistry in Moscow by University of California professor, Dr. Daniel I. Arnon.

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Tranquilizer Effects

➤ PHENOTHIAZINE tranquilizers, used to depress the central nervous system and induce sleep, may be producing their effects by speeding the action of an enzyme in the brain, five biochemists from the University of Nebraska Hospital, Omaha, reported.

The effect of this particular group of compounds was described as "the most striking" observed in a general study of what tranquilizing agents do to enzymes, the catalysts that increase the rate of chemical reactions in cells.

Phenothiazine drugs were shown to step up the activity of a brain enzyme called L-glutamic decarboxylase. The enzyme changes glutamic acid to gamma-aminobutyric acid, which inhibits the functions of the central nervous system.

Dr. Herbert P. Jacobi, Dr. David Rosenberg, Dr. M. J. Carver, John Haggstrom and Martha Kelly, all of the University's biochemistry department, made their announcement at the International Congress on Biochemistry in Moscow.

Their study is based on the theory that the body's chemical processes are based principally on enzyme activity, and that the chief action of drugs used to treat diseases is one of interference with enzymes.

Information on drug-enzyme interaction is expected to give new insight on disease causes, as well as to help determine what drugs should be prescribed for varying types of ailments.

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Method Measures Protein

➤ AN IMPORTANT TOOL is seen in the discovery of a new technique for separating and measuring the sub-units of large protein molecules.

Dr. Francis J. Reithel, head of the University of Oregon chemistry department, reported his new technique at the Fifth International Congress on Biochemistry in Moscow. Up to now geneticists have had to use small protein molecules, which are not numerous. Separation of the sub-units of large molecules will give access to a larger number of molecules for this research.

The new technique involves dissolving purified proteins in a chemical reagent known as guanidine hydrochloride. Dr. Reithel uses an ultracentrifuge, a refined version of apparatus that separates material by rotation.

To separate the sub-units, Dr. Reithel used a technique called sedimentation equilibrium, in which diffusion of the molecules offsets centrifugation. The molecular weights are determined from readings on photographs, taken while the ultracentrifuge is in motion.

Ordinarily the sedimentation equilibrium process takes days, but by using a very short column of one millimeter or less of protein solution in the ultracentrifuge the experiments were reduced to a few hours. This use of a short column is less than two years old.

For his protein material Dr. Reithel uses enzymes, a class of organic substances that accelerate specific transformations in living cells. Dr. Reithel produced a pure form of an enzyme called beta-galactosidase, which comes from a common intestinal bacterium.

This enzyme appeared to have a molecular weight of 700,000 but it also showed evidence of having smaller functional units. Preliminary observation indicates a molecular weight of 35,000 for each of 20 sub-units.

Dr. Reithel said the analytical technique of combining the short column, sedimentation equilibrium method with the use of guanidine hydrochloride is a very convenient and powerful tool for determining molecular weights on very small quantities of material. He is now studying methods for preventing the separated sub-units from rejoining.

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GEOLOGY

Antarctic Research Program Planned

➤ THE UNITED STATES will soon launch its most ambitious program of scientific research in the Antarctic.

More than 200 scientists from various universities, research institutions and Government agencies will converge on the white continent in October to take part in research projects on and around the continent. Estimated cost of the program is about $5,500,000.

The studies include exploring one of the largest little-known mountain ranges, studying the unusual animal life, and making a glacial survey of the Ross Ice Shelf. One group of scientists will stay at a substation completely shut off from the rest of the parties for five months.

The "summer" season will be the first since the United States signed the cooperative Antarctic Treaty with 12 other nations. The treaty pledged all participating nations to the peaceful use and exploration of the continent.

The U. S. Antarctic research program is supported and coordinated by the National Science Foundation. The U. S. Navy provides the main logistic support for the scientific effort.

A floating research laboratory, the USNS Eltanin, will be operating in Antarctic waters for the first time. The Eltanin, outfitted primarily for oceanographic research, will also be used for meteorological and other related research.

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BIOCHEMISTRY

Polio Spread in Cells

Cells tagged with radioactive materials revealed the process inside a cell attacked by poliovirus. The virus is believed to have an early effect on the nucleolus.

➤ SCIENTISTS who attended the Fifth International Congress on Biochemistry in Moscow have a clearer picture of what happens inside a cell attacked by poliovirus.

Dr. Hilton B. Levy of the National Institute of Allergy and Infectious Diseases, Bethesda, Md., reported that new evidence came to light when cells tagged with radioactive materials took X-rays of themselves during the infection process.

Within an hour after infection, Dr. Levy said, the ribonucleic acid (RNA), one of the chemicals involved in genetic transfer of information, begins working overtime in the nucleolus (a nucleus within the nucleus) of the cell. Soon afterward, some of the RNA formed in the nucleolus finds its way into the cytoplasm, the cell substance surrounding the nucleus.

At two hours, the first new polio protein appears in the cytoplasm. At three hours, polio protein appears in the nucleus itself, as a narrow ring around each nucleolus. At this time, the flurry of RNA activity is still going strong, but begins to decline by four hours, and the deoxyribonucleic acid (DNA), the other genetic chemical, also shows a decrease in activity.

By the fifth hour, RNA action in the nucleolus has almost stopped and the new infectious virus, not just its protein components, shows up in the cytoplasm.

On the basis of these data, Dr. Levy has suggested the following working hypothesis: the virus has an early effect on the nucleolus—possibly the virus RNA enters the nucleolus. The nucleolus is stimulated early to produce new ribosomes for specific virus protein manufacture in the cytoplasm. By three to four hours a new protein, possibly a nucleoprotein, is made in the nucleolus, through at least the mediation of the nucleolus, and this substance emerges into the cytoplasm to form new infectious virus. When the nucleolus has done this its RNA and DNA metabolism stop.

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Fatty Substance Found

➤ A NEW TYPE of fatty substance has been discovered. It was found in the digestive gland of the common starfish, but also occurs in mammals.

The substance, a phosphate-free plasmalogen, remained undiscovered until now because it is present in such minute quantities. Beef brain contains three parts of this lipid, guinea pig heart 15 parts, and beef bone marrow 50 parts per 10,000 parts of total fatty substance in each organ.

Discovery of the phosphate-free plasmalogen by Dr. Manfred L. Karnovsky, Dr. John R. Gilbertson and Joseph Eichberg of Harvard University Medical School was reported to the Fifth International Congress on Biochemistry in Moscow. Evidence for the existence of another group of similar substances containing sterols has also been obtained.

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Fights Foreign Protein

➤ NEW FACTS reported at the Fifth International Congress on Biochemistry in Moscow indicate that the reaction of the body to foreign proteins is chiefly the reaction of general rather than specific cells within the body.

The reaction to foreign protein, of which some allergies are examples, is actually a build-up of antibodies to any foreign protein, also known as an antigen.

Dr. F. Haurowitz of Indiana University, Bloomington, working with M. Richter and S. Zimmerman, reported that, contrary to popular belief, antibody production does not stop after the first injection of an antigen. Even after a single injection, antibody production continues in rabbits for more than a year.

The second injection causes immediate formation of antigen-antibody complexes and these complexes act as a strong stimulus for the antibody-forming cells. The antibody content of the blood then increases rapidly.

The findings are in opposition to the theory proposed by the Australian Nobelist, Sir F. Macfarlane Burnet, that the body has built-in cell types and that each type can manufacture antibodies of only one type. When antigen A is injected, those cells that form anti-A will be stimulated to excessive growth and multiplication, the theory states.

This theory does not explain how the body can react against unnatural proteins manufactured by chemists, but not found anywhere as natural substances. Presumably the body would have cells prepared to deal only with naturally occurring substances.

The explanation proposed by the scientists indicates that the antibody-forming type of cell has the ability to form antibodies against any type of antigen, not just one.

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Sulfa Tricks Enzymes

➤ SULFA DRUGS can fight human infections because enzymes are tricked into using them instead of a specific acid.

Dr. Gene M. Brown of Massachusetts Institute of Technology told the Fifth International Congress on Biochemistry in Moscow that a large part of sulfonamide and a small amount of para-aminobenzoic acid means the formation of very little folic acid, and thus little chance of bacterial growth.

In the 20 years during which sulfa drugs have been in use, scientists and physicians have not been able to pinpoint just why they were so effective.

The chemical properties of sulfonamides and para-aminobenzoic acid are so similar that it is possible to fool the enzymes, which are the "mechanics" of bacterial growth, into using them in place of the acid.

Sulfonamides are not toxic to animals, which do not manufacture the vitamin folic acid, but the animals are continually in need of a dietary supply of the acid. Sulfa drugs or compounds fed to an animal do not affect the animal directly, but do prevent the growth of infection-causing bacteria by "inhibiting the enzymatic formation of folic acid by these bacteria."

The biochemist said most bacteria prefer to manufacture their own folic acid and cannot use outside sources at all.

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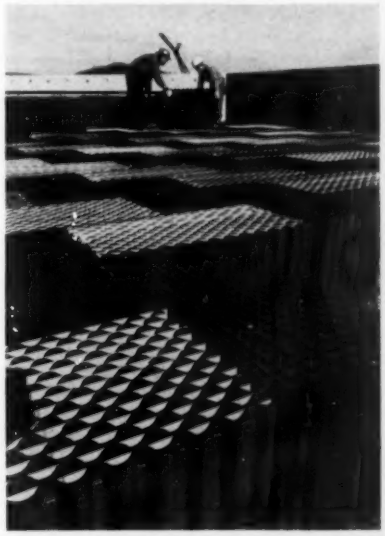

FILTER FOR REDUCING WASTE

TECHNOLOGY

Vertical Filter Plant For Reducing Waste

➤ A VERTICAL filter system for reducing the amount of industrial waste flushed into a river has been built.

The three-story-high plant has vinyl honeycomb units acting as a filter for the waste water trickling through. More than 6,000 honeycomb "cells" can be stacked one on top of the other, reducing the land area for plants of this type.

Jointly developed by The Mead Corporation, Dayton, Ohio, and Rome Kraft Company, Rome, Ga., the plant will be used to treat pulp and paper waste.

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SCIENTIA INTERNATIONAL

NOVAS DEL MENSE IN INTERLINGUA

Statistica Vital.—In 1959, le numero total del mortes in le Statos Unite esseva 1.659.000, incluse 0,7 pro cento causate per tuberculosis, 1 pro cento per suicidio, 1 pro cento per cirrhosis hepatic, 1 pro cento per malformationes congenite, 2 pro cento per diabete mellite, 3 pro cento per influenza e pneumonia, 16 pro cento per cancere, e 55 pro cento per morbos cardiac e circulatori. Iste ultime categoria contava 915.610 mortes. In 1957, solmente 891.825 mortes habeva essite causate per morbos del corde e del circulation. Ab 1957 ad 1959, etiam le mortalitate per cancere monstrava un tendentia augmentatori. Le totales in le duo mentionate annos esseva 253.183 e 259.090 mortes per cancere.

Technologia Medical.—Un auriphono, que es inserite non in le aure sed in un dente (e ergo deberea esser appallate un "dentiphono") esseva patentate per duo inventores de New York. Le apparato es un micrissime receptor endodontic que es connectite con le cerebro via le systema nervose facial. Le inventores assere que le audition via lor "dentiphono" non differe del audition auricular normal.

Recercas de Cancere.—Le uso de un droga experimental in septe desperate casos de cancere al Centro Medical Albany (in Albany, New York) resultava in tres in un serie (ben que reversibile) pericarditis (i.e., inflammation del sacco que inveloppa le corde). Esseva trovate que le droga in question non es promittente como agente cancerotherapeutic, sed le caso es reportate proque effectos nocive in le corde es probabilemente pauco exceptional in le experimentation con le semper crescente arsenal de compositos testate e a testar in le tractamento de cancere. Reportate per Drs. R. C. Yates e K. B. Olson.

Technologia Atomic.—Le recentemente effectuate forationes submarin (parte del projecto "Mohole" que visa ultimemente a penetrar in le mantello del terra) ha demonstrate, secundo Prof. J. D. Isaacs del Institution Scripps de Oceanographia a La Jolla in California, que il es technicamente possibile pro le industria de energia atomic solver le problema del rejectos radioactive per deponer los in excavationes specialmente facite pro iste objectivo al fundo del oceano. Le systema requirerea le servicio de un grande nave que colligerea le rejectos periodicamente in le grande portos del mundo e que esserea equipate con le machinas necessari pro executar labores foratori a multo grande profundores submarin.

Agronomia.—Le production de ris in West-Africa pote esser grandemente augmentate per exploitar, pro iste objectivo, le enormemente extense paludes de mangliero in ille parte del mundo. Le Organisation pro Alimentos e Agricultura del Nationes Unite ha establite un serie de stationes de recerca e experimentation risicultural in Senegal, Sierra Leone, Nigeria, Ghana, le Costa Eboree, e altere paises west-african e reoprta promittente successos preliminari. Pro adjutar West-Africa a devenir un del macroproductores de ris del mundo on ha ancora a solver complexe problemas technic, industrial, e etiam sociologic, sed le prospectos es incoragiante secundo Sr. N. Parthasarathy, qui es un experto de risicultura in le servicio del mentionate organisation.

Physica Atomic.—Al Centro Medical del Universitate Cincinnati, experimentos con rattos ha monstrate, non inexpectatemente, un alte grado de retention intracorporee de diverse injicite doses de cesium-137. Pro render le exposition del animales a cesium-137 plus "natural" (i.e., pro simular plus proximemente le conditiones de un explosion atomic accidental o bellicose), le injectiones del radioisotope esseva combinate con le exposition del animales a irradiation ionisante. Esseva trovate, satis inexpectamente, que le irradiation reduceva le retention de cesium-137. Le mechanismo de iste effecto pareva esser que le irradiation stimulava le urination, con le resultato de un plus marcate excretion urinari del radioisotopo de cesium-137.

Alimentos.—Dr. D. MacDougall del Corporation Chemagro reporta que fluorescentia sub irradiation ultraviolette representa le plus sensibile methodo de deteger e mesurar residuos de insecticidas que es a vices presente in alimentos. Le methodo es applicabile solmente si le substantia a deteger es fluorescente, o si un substantia fluorescente pote esser producite ab illo.

Historia de Medicina.—Dr. J. T. Rowling reportava al Societate Royal de Medicina in London que nove technicas de examine radiologic permitte le observation de multe previemente inaccessibile detalios medical in le ancian mumias de Egypto. Le pharaon Siptah suffreva de pede equin e Rameses V, apparentemente, de variola. Altere morbos detegite in le mumias include pneumonia, appendicitis, calculo biliari, e tuberculosis. In general, le mesme morbos que es frequente al presente tempore esseva etiam frequente in ancian Egypto, con duo exceptiones: le mumias non exhibi symptomas de syphilis, ni, probabilemente gratias al conformation de lor sandalias, de deformationes del halluce.

Recercas de Cancere.—Dr. D. Agostino e Dr. E. E. Cliffton del Centro Memorial de Cancere Sloan-Kettering e Dr. C. E. Grossi del Institutos National de Sanitate reportta que injectiones de heparina grandemente reduceva le numero de cellular cancerose in le sanguine de rattos que previemente habeva recepite inoculationes de 300.000 cellulas de carcinosarcoma Walker 256. Multe experimentos additional con animales es necessari ante que simile experimentos pote esser tentate in humanos.

Chimia.—Le Consilio del Union International de Chimia Pur e Applicate ha adoptate carbon-12 como standard pro le calculation del pesos atomic de omne le elementos. Iste action del Consilio, prendite a su recente reunion in Montreal, confirma le previe decision del correspondente organisation international de physicos. Previemente le standard generalmente acceptate esseva oxygeno natural (un mixtura del isotopos 16, 17, e 18) in le chimia e oxygeno-16 in le physica. Le Union International de Chimia Pur e Applicate representa chimistas de omne partes del mundo, incluse le paises communista. In le longe controversio que precedeva le adoption del nove standard le lineas de division non esseva "inter le nationes" sed plus tosto inter le varie brancas de scientia interessate.

Glaciologia.—Le glaciologo russe, A. V. Shnitnikov, predice que le regression del glacieros del mundo, arrestate durante le passate duo deceninos, va recomenciar e continuar pro multe seculos.

Hygiene Oral.—Le otologo, Dr. R. G. Ralph, ha notate que masticatores de chicle mastica quasi semper unilateralmente, con le frequente resultato de dolores in le aure contralateral. Therapia: Masticar ambilateralmente.

Television.—Dr. S. Deutsch del Instituto Polytechnic Brooklyn ha disveloppate un systema de transmission de signales de television que emplea undas curte de 45.000 cyclos per secunda in loco del microundas de 4,000,000 cyclos per secunda que es communmente utilisate.

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GENERAL SCIENCE

Reading Interlingua

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PSYCHIATRY

Speech Measures Anxiety

➤ A YARDSTICK that measures a person's anxiety as expressed in his speech has been found.

The amount of anxiety a person feels at any one time was measured using five-minute verbal samples. These were then taped, transcribed and scored according to how many times the person tested referred to anxieties of death, mutilation, separation, guilt, shame and nonspecific anxiety, and the importance he placed on them.

Dr. Goldine C. Gleser of the University of Cincinnati College of Medicine said the subjects tested for anxiety were asked to talk for five minutes without interruption about any interesting or dramatic life experience they had had.

He told the International Congress of Applied Psychology in Copenhagen that one score alone did not indicate the subject's typical level of anxiety, since scores differed from day to day.

The new technique can be used to measure other emotional states, besides anxiety, Dr. Gleser reported. It has been applied in studies of rhythmic variations in emotional states of women during the menstrual cycle. The new scale might be used in interviews.

It measures what is termed "free" anxiety in contrast to "bound" anxiety manifested in symptoms, compulsions or withdrawal from human relations.

Co-authors with Dr. Gleser were Drs. Louis A. Gottschalk and Kayla J. Springer. Dr. Gleser pointed out that there are relatively few methods for measuring immediate emotional states. Most psychological tests have been designed to measure general traits or typical behavior and are therefore fairly insensitive to variations in emotional behavior.

The work was supported by the National Institute of Mental Health and the Foundations Fund for Research in Psychiatry.

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CHEMISTRY

Melt by High Temperature

➤ EVERY KIND of material known, including resistant substances like quartz and tantalum, can be melted with a new method of high-temperature production that combines combustion flames with electrical discharges.

The electrical voltage pumps into the burning flame double the heat that combustion alone can develop. Chemists foresee that the new high-temperature technique will find wide usefulness in metallurgical processes and allow more effective production of aluminum, steel and pure iron. It will beef up the open hearth steel process.

Its inventor, Dr. B. Karlovitz of Combustion and Explosives Research of Pittsburgh, described the process to the International Union of Pure and Applied Chemistry in Montreal. He predicts that his work will allow gas to compete with electricity in the production of industrial temperature ranges of about 4,000 degrees to 9,000 degrees Fahrenheit (2,000 to 5,000 degrees Kelvin). In recent years electricity has displaced gas in high-temperature production, and now the tables will be turned.

The kind of flame necessary to the job to be done, rich reducing for pulling oxygen out of the oxide ores of metals hard to separate, can be obtained as desired. Or conversely the flame can be made to add oxygen. High electrical voltage is not needed and the electrodes that feed the current into the fire are not in the heat of the furnace. The gas flame is conductive of the electrical discharge and spreads out the electrical power broadly into the furnace.

If desired, the flames can be made slowly radiant or they can be jets that are highly concentrated with high velocity. The flames can be shaped to fit a special need.

Dr. Karlovitz had the cooperation of Arthur D. Little, Inc., Cambridge, Mass., in the fundamental experimental study of flames that led to the materialization of the new process.

Half the energy of the furnace can be supplied by the electricity, and this addition gives the temperatures so much higher than the gas combustion alone.

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OCEANOGRAPHY

Radioactive Waste Dump

➤ RADIOACTIVE WASTES can be safely disposed of by dumping them in wells drilled deep into the ocean bottom.

A huge ship, especially designed for storing radioactive waste, would be used to drill wide holes in deep ocean submarine canyons, Prof. John D. Isaacs of the Scripps Institution of Oceanography, La Jolla, Calif., reported. The waste material would be lowered into the hole and buried.

Buried under tons of sediment far from heavily populated areas, the radioactive wastes would pose no health problems, Prof. Isaacs said. The radioactive heat generated while contained in the ocean bottom layers will not erupt into a "radioactive geyser," whereas atomic wastes stored in underground vats on land can, the scientist emphasized.

The huge ship, acting as an "atomic disposal unit," could cruise from port to port, picking up the "atomic trash." The ship's design would be similar to CUSS I, a ship recently used for drilling deep into the earth's interior.

Such a drilling ship is entirely feasible, the scientist said. United States scientists recently drilled three test holes into the ocean bottom in one day as part of project Mohole, whose goal is to eventually reach the earth's mantle deep under the ocean bottom.

Each were sufficiently deep to bury the radioactive wastes, Prof. Isaacs said.

The wastes can be stored in capsules or mixed with concrete slurry and pumped into the hole. The watery mixture would then solidify when it reached bottom.

The present method of storing radioactive matter in huge underground tanks could eventually contaminate underground water supplies. Dumping waste matter into ocean waters, and not underneath the ocean bottom layers, is also dangerous due to the eroding and mixing action of currents.

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INFRARED PHOTOGRAPHY

PHOTOGRAPHY

Infrared Photography Used in Arctic Tests

➤ INFRARED PHOTOGRAPHY was used by U. S. Air Force scientists in Fairbanks, Alaska, to measure varying body temperatures in arctic survival tests.

A typical experiment showed that the skin of a man clothed only in shorts and exposed to 32-degree Fahrenheit weather would cool from 80 degrees to 40 degrees Fahrenheit in approximately one hour.

Results of the experiment indicated that the rate of heat loss is higher in the armpits, spinal column and areas surrounding the knees and elbows.

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ASTRONOMY

Life May Exist on Jupiter

➤ LIFE MAY EXIST on Jupiter, the largest planet in the solar system, experiments have shown.

Generally, life on the cool planet 483,000,000 miles away from the sun is held unlikely. However, Dr. Carl Sagan, Miller research fellow of the University of California, Berkeley, Calif., performed simulated atmospheric studies showing that simple organic molecules are produced in the atmosphere of Jupiter by the action of ultraviolet light from the sun and atmospheric electrical discharges.

As visible light penetrates through the clouds of ammonia in Jupiter's atmosphere, it is absorbed by the surface and emits infrared radiation that cannot return into space. This situation leads to the "greenhouse effect" in which the temperatures at the surface increase because no heat can escape. Temperatures near 70 degrees Fahrenheit may exist on the surface.

Organic molecules created at a rate of 10 pounds per square mile per year may fall into seas of water or ammonia. Here they would dissolve and create the conditions necessary for complex organic reaction under which life would be likely to arise.

Dr. Sagan said the possibility is somewhat better for life on Jupiter than on the planet Venus, where the greenhouse effect also operates. Life on Venus is not as likely because temperatures there are believed to be in excess of 600 degrees Fahrenheit.

He said that the question of existence of life on Mars is far from settled, although evidence taken as a whole suggests some life on the planet. Dr. Sagan reported his research in the journal, Radiation Research.

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SPACE

Orbiting "Needles" Belt

➤ A GLOBE-GIRDLING belt of orbiting "needles," or dipoles, scheduled to be launched as a communications experiment before the year's end, will be "barely detectable" and will not interfere with astronomical observations anywhere in the world, the Space Science Board of the National Academy of Sciences assured.

The Board released a United States Government policy statement received from Dr. Jerome B. Wiesner, President Kennedy's special assistant for science and technology. Dr. Wiesner said no more dipoles will be put into orbit until results of the first launching, called Project West Ford, are "analyzed and evaluated." He also said "necessary safeguards" will be developed "against harmful interference with space activities or with any branch of science" before any decisions are made on follow-up experiments.

Astronomers had expressed concern that dipole reflections might interfere with research on such astronomical phenomena as light signals from stars and radio signals from objects in the heavens.

A dipole is a tiny strip of copper wire acting as a radio antenna. Each strip is seven-tenths of an inch long and one one-thousandth of an inch in diameter.

To see if dipoles can be used as relay devices in long-range communications, the Government plans to launch 350,000,000 of them in a polar orbit to form a belt around the earth. They will be sprayed into space, about 2,000 miles out, by an ejection mechanism as the carrier satellite goes into orbit. The payload will weigh about 75 pounds.

In 60 days, the dipoles are expected to converge into a circling belt some five miles high and 24 miles thick. They will be pretuned to reflect radio waves at 8,000 megacycles.

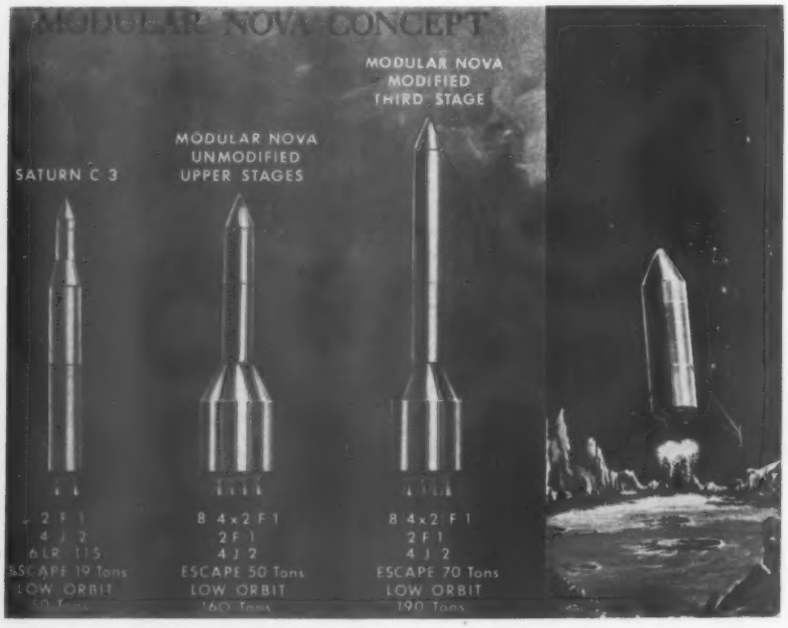
If the system proves practical, later belts could make available a part of the crowded radio spectrum not now in use.

The Board emphasized that the West Ford Project is intended to be "purely experimental" and not an operational system.

The Lincoln Laboratory of the Massachusetts Institute of Technology, Cambridge, Mass., is in charge under Government auspices. The Air Force will provide the launch vehicle. An Air Force spokesman was quoted as saying that no announcement is ready on the actual launching date, probably to be "later this year," or the type of vehicle to be used.

The initial belt will be in an "essentially circular" orbit, and is expected to last "a few years." It was also described as no more hazardous to spacecraft than are micrometeorites.

• Science News Letter, 80:134 August 26, 1961



REACHING FOR THE MOON—Three combinations in which the F-1 liquid fuel rocket engine may be used for flights to the moon. At right is a hypothetical Nova-launched spacecraft near the moon's surface.

SPACE

Big Booster Engine Now Being Tested

See Front Cover

➤ MORE THAN 1,000,000 pounds of thrust is achieved by the F-1 rocket engine during the first public tests, seen on the cover of this week's SCIENCE NEWS LETTER.

The F-1 is the largest booster engine in the Free World and may be used in the U. S. Nova project to launch man to the moon. Three combinations using the F-1 engine are now under consideration:

Saturn C-3 with a first stage of two F-1's having 1,500,000 pounds thrust each, a second stage of four 200,000-pound thrust J-2 engines and a third stage of six RL-10-A3 engines with 15,000 pounds thrust each.

A Nova rocket consisting of a first stage with eight F-1's, a second stage of two F-1's and a third stage of four J-2's.

A similar Nova rocket with the third stage lengthened to hold more fuel, increasing escape payload capability to 70 tons, or enough to land three men on the moon.

The F-1 engine was developed by Rocketdyne, a division of North American Aviation, Inc., Canoga Park, Calif.

• Science News Letter, 80:134 August 26, 1961

SPACE

Echo I Is Space Hero

➤ THE ECHO I communications satellite is now one year old and a space hero—it has even had a stamp issued in its honor.

The 100-foot aluminum sphere, now battered by the space "bullets" called micrometeorites, has chalked up many accomplishments during its amazingly long lifetime. Among the most important transmissions of its 150 experiments were:

Telephone conversations between the east and west coasts of the United States.

Facsimile photographs and a letter sent by the U. S. Post Office Department.

Voice and music between the U. S. and England.

A voice message by President Eisenhower during its first orbit around the earth.

Radio frequency energy between the U. S. and France.

The Echo I has traveled 4,480 times around the earth for more than 138,000,000 miles. It was launched from Cape Canaveral, Fla., Aug. 12, 1960, and has been seen by millions of people since then.

Echo I has enabled scientists to confirm orbital behavior theory. Because of its larger size and small mass it is extremely sensitive to solar radiation pressures and air drag. This causes the orbit to shift from a circular to an elliptical path.

When launched a year ago, Echo I's orbit was 1,049 miles when farthest away from earth and 945 miles when closest. During the months until December, 1960, the satellite was forced by solar pressures into an orbit of 1,350 and 580 miles when farthest and closest. By mid-June this year the orbit was a circle 960 miles above the earth. Now Echo I is again moving in an ellipse between 1,093 and 827 miles up.

The National Aeronautics and Space Administration reported that Echo II is planned as an even bigger sphere (135 feet) rigidized with a frame of laminated aluminum and plastic. The outside "skin" will also be stronger than that of Echo I, which can still be observed from earth.

• Science News Letter, 80:135 August 26, 1961

SPACE

New Type Satellite

➤ THE FIRST in a new series of satellites was launched Aug. 15 to travel an unusual path around the earth.

The probe, Explorer XII, is reaching 50,000 miles into space when farthest away from earth (apogee). At its closest point (perigee) it streaks across the sky 170 miles up.

The satellite is being used to study the behavior of energetic particles, electrons and protons, the minute building blocks of matter present in space. These particles sift down into the earth's atmosphere and cause radio disturbances, communications blackouts, magnetic storms, Northern and Southern Lights.

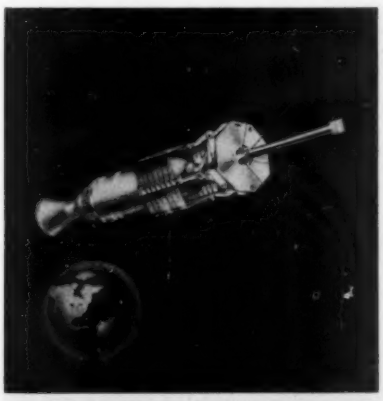
The new satellite, the first of four, is testing the particle population of space and also of the trapped radiation regions (the Van Allen belts) surrounding the earth and considered a hazard for space travelers. The satellite travels through these belts twice in each 31-hour orbit. The doughnut-shaped Van Allen belts surround the earth at latitudes of less than 70 degrees between 600 and 30,000 miles up.

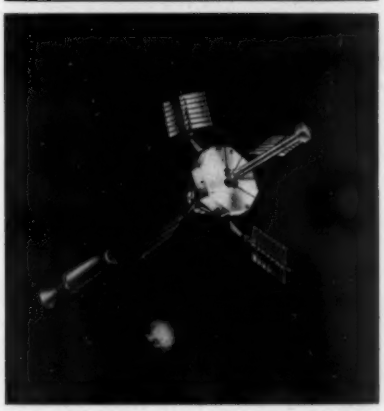
The four satellites are planned to observe the solar wind, interplanetary magnetic fields and the distant regions of the earth's magnetic field, the National Aeronautics and Space Administration reported.

The 83-pound octagon-shaped satellite was launched by a three-stage Delta rocket from Cape Canaveral, Fla. The NASA Goddard Space Flight Center, Greenbelt, Md., had the major responsibility for the satellite. The Ames Research Center of NASA, the University of New Hampshire and the State University of Iowa have contributed some of the experiments.

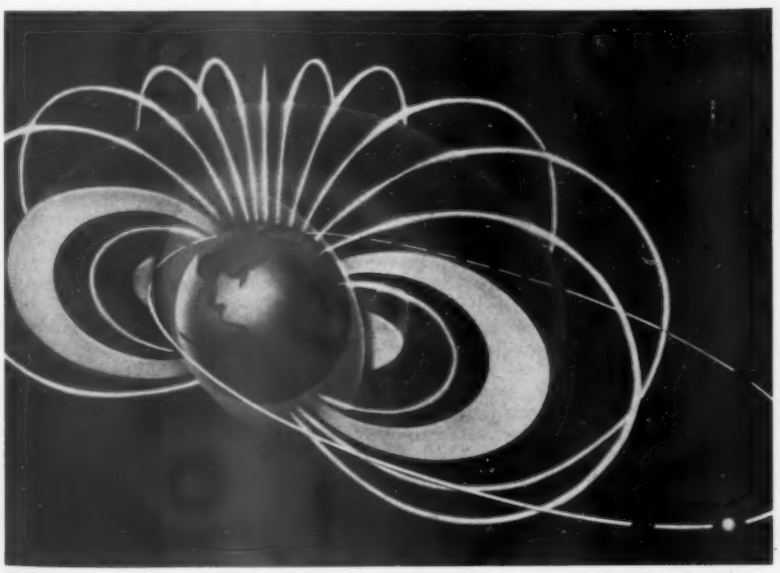
The entire particle spectra from energies of a few electron volts to 10 billion electron volts will be measured. A magnetometer on a boom, some 32 inches from the satellite body, determines particle interaction with magnetic fields.

• Science News Letter, 80:135 August 26, 1961





SATELLITE UNWINDS—Yo-yo weights despin the third stage of the Delta rocket and Explorer XII traveling at more than 24,000 miles an hour (represented at top). Four solar paddles are released when an explosive-actuated cutter severs a nylon rope after the third stage is separated by explosive bolts and a spring mechanism (bottom).



PARTICLE SLEUTH—The Explorer XII is reaching far into space to study bits of matter in the trapped radiation regions of the Van Allen belts surrounding the earth as a huge doughnut.

MEDICINE

Cancer Cells Disappear After Heparin Injections

➤ CANCER CELLS have been found to disappear rapidly from the blood stream of laboratory animals after they were injected with heparin, a substance that prevents blood clotting.

A total of 1,592 rats were used in an experiment set up to determine the effect of heparin on the fate and survival of Walker carcinosarcoma 256 cells. When the anticoagulant was given after a single inoculation of 300,000 of these cells, the number and transplantability of the circulating cells was greatly decreased.

The results, described as "very striking and significant," are of importance in understanding the way tumors spread. But additional investigations are needed to determine the presence of tumor cells in the abdominal cavity and thoracic duct lymph.

Further experience with other easily transplantable tumors will be necessary before tests on humans can be considered.

The findings of Drs. D. Agostino and E. E. Cliffton of Memorial Sloan-Kettering Cancer Center, New York, and Dr. C. E. Grossi of the National Institutes of Health, Bethesda, Md., are reported in the Journal of the National Cancer Institute, 27:17, 1961.

• Science News Letter, 80:136 August 26, 1961

PUBLIC HEALTH

Helmet Changes Urged To Lower Football Deaths

➤ FOOTBALL HELMETS should be redesigned in an effort to halt "a slowly progressive upward trend" in fatal gridiron injuries involving the head and spinal cord, two physicians and two athletic officials at the University of Michigan, Ann Arbor, believe.

They recommend replacing the hard plastic used in helmets with a material with more "give," such as leather or heavy sponge rubber. They also favor a shorter face guard and a chin strap that is either more elastic or is built with a safety lock designed to "break or open at given pressures."

Reporting in the Journal of the American Medical Association, 177:371 and 445, 1961, Dr. Richard C. Schneider, Dr. Edward Reifel, Herbert O. Crisler and Bennie G. Oosterbaan state their views are based on a study of 14 fatal head and spinal cord injuries in U. S. football during 1959.

In three of the cases, the spinal cord was injured when the player's face guard was thrust up and back, driving the helmet's sharp rear rim against the back of the neck.

The face guard, protruding three and one-half inches, makes a handy lever for tacklers to grab, the researchers noted. This is illegal in amateur football, but permitted in "pro" games.

If it continues to be used, the solid plastic guard should be shortened and placed closer to the face, they said. This would make the bar less easy to grab, cut down the damaging leverage on a backward fling, improve vision, and provide less bar surface to injure an opponent's face.

Meanwhile, they agree that "the player with a long thin neck is a bad risk."

There were 208 fatalities in American football from 1947 through 1959. With an estimated 2,500,000 persons playing in 1959 (65,690 in college football), the researchers believe it is "remarkable" that "there are only an infinitesimal number of fatal injuries."

• Science News Letter, 80:136 August 26, 1961

PHYSICS

Ordinary Substances Give Off Soft Radiation

➤ TINY PILES of metal powder give off soft radiation.

Distinct radiation imprints were discovered on X-ray film exposed to such ordinary substances as zinc powder and aluminum filings. The imprints were probably formed by a soft electron flow from the metals, Dr. Stuart McLean of the General Electric Company's Lamp Research and Development Operation, Cleveland, Ohio, reports.

The powders, sometimes mixed with a medium, were inserted in holes gouged out of wooden blocks and X-ray films attached to the blocks were exposed for 48 hours.

X-ray patterns showed up even when the film was moved six inches away from the source, the scientist stated. The patterns varied with different pressures and temperatures, suggesting the radiation "producer" is closely tied with the kinetic condition of the source, Dr. McLean reports in Nature, 191:690, 1961. Similar effects on X-ray film were also obtained from organic mixtures.

• Science News Letter, 80:136 August 26, 1961

MEDICINE

Test to Detect Allergies Before Symptoms Seen

➤ A POSSIBLE TEST to detect allergies in persons before they develop symptoms was foreseen from research on the basophil, the rarest member of the blood family.

The role of basophil, which is a key factor in a variety of allergies and cardiovascular ills, is being studied by Drs. Lennart Juhlin, now at University Hospital, Uppsala, Sweden, and Walter B. Shelley, University of Pennsylvania School of Medicine, Philadelphia. They found that patients overly sensitive to cold react to release histamine from basophil, which carries nearly all of the histamine in the blood.

Since histamine can cause allergic reactions, basophil is of interest in all allergies. Persons having the acquired type of cold sensitivity caused by histamine that was studied by Drs. Juhlin and Shelley react to a drop in skin temperature regardless of how it is produced. The result is a red, itching skin rash, they report in the Journal of the American Medical Association, 177:371, 445, 1961.

• Science News Letter, 80:136 August 26, 1961

IN SCIEN

GEOPHYSICS

Meteoric Showers Raise Density of Atmosphere

➤ THE METEORIC showers that occasionally rain down from the sky increase the density of the earth's upper atmosphere.

Meteoric particles streaming into the upper atmosphere heat its lower layers, causing a rise in the density of the thin air 200 to 400 miles above the earth. The density may increase as much as ten percent, Dr. S. I. Rasool of the Institute for Space Studies, New York, reports in Science, 134: 385, 1961.

Data from satellites show that the earth's atmosphere collects more than 100,000 tons of interplanetary dust each day. This figure can skyrocket up to 100 times as much during a meteoric shower.

The tremendous energy generated by the hurtling particles is enough to raise the temperature nine degrees in the lower regions of the ionosphere, Dr. Rasool states.

The heating effect, which takes about six hours, occurs at altitudes of about 70 miles.

Meteoric showers occur when the earth crosses the path of a meteor that is orbiting around the sun. Most of the time the event is so unspectacular the man on the street never sees it.

• Science News Letter, 80:136 August 26, 1961

PHYSIOLOGY

Studies Brain's Role In Optical Illusions

➤ SO-CALLED "optical illusions" may result "at least partly" from central processes involving the brain, rather than just the retina, the eye's image-receiving membrane.

Scientists of the National Physical Laboratory, Teddington, Middlesex, England, say recent experiments bear out this theory.

A standard geometrical illusion, giving the appearance of depth with an arrangement of dotted lines on a flat surface, was drawn on a sheet of glass. A second glass sheet was covered at random with dots. The sheets were then placed a few inches apart in parallel positions.

With the head in a rigid position and shadows eliminated to provide no clues to distance, an observer using only one eye would see the two planes as merged, and could not distinguish the illusion figure. But the use of both eyes separated the two planes and made the illusion clearly distinguishable.

S. Papert, reporting in Nature, 191:733, 1961, states more elaborate research is in progress. Items in use include stereoscopic designs built by an electronic computer, and colored dots at the end points of the illusion figure to determine changes in distance judgments under differing visual conditions.

• Science News Letter, 80:136 August 26, 1961

NE FIELDS

PSYCHOLOGY

Culture of "Uninvolved" Will Succeed Beatniks

➤ THE "LONELY CROWD" will probably give way to the "uninvolved one," a New York psychiatrist has predicted.

The Angry Young Men and the Beatniks will be followed by a generation that does not protest any more because it will no longer have a need for deep permanent relations.

Dr. Leopold Bellak of City Hospital at Elmhurst, New York City, said that by adapting to a constant flow of changing stimuli, modern man is losing his identity. He sees a character structure developing in American society that has no strong identification, similar to children reared in many different foster homes and orphanages.

"This type of character has also been seen in people exposed to overwhelming experiences, such as in former inhabitants of concentration camps.

"They may appear well functioning enough, but hardly anything seems to go more than skin deep; there is a strong armor that wards off all more intense feelings."

Dr. Bellak foresees amiable relations, a kind of "cocktail party" sociability, with greater interdependence alongside a "probably still higher standard of living." But this smooth, urbane culture will be uninvolved, with no sense of belonging, he said in the Archives of General Psychiatry, Aug., 1961, published by the American Medical Association.

• Science News Letter, 80:137 August 26, 1961

NATURAL RESOURCES

Proposed Hotel in Grand Canyon Will Not Be Built

➤ THE NATIONAL Park Service has strongly denied that a hotel will be built in the Grand Canyon.

D. E. Lee, Park Service land expert, made the denial after a recent announcement by a mining firm of a proposed plan to build an 18-story hotel in a Grand Canyon wall. The hotel would be built on the few acres of private land remaining in the canyon.

A bill is now pending in Congress to prevent the structure from going up. If that does not pass, the National Park Service will "undoubtedly" step in and buy the land, Mr. Lee stated.

The hotel would be built on the south rim of the canyon in full view from virtually any vantage point. The gleaming white hotel, standing boldly against the many hues of the canyon walls, would descend like steps down one canyon wall.

An oval pool is planned at the base of the hotel.

More than 20 acres of the south rim—the only rim land not in Government hands—is owned by Western Gold & Uranium, Inc., which is studying the feasibility of building the hotel.

The Senate bill, scheduled for public hearings soon, would permit the National Park Service to obtain surface rights, including the hotel site, to the mining company's land. In return, the company can burrow into uranium veins that extend underground on land owned by the Government. Royalties would be paid to the Government.

The Park Service could also buy the land from funds appropriated for purchasing the thousands of acres within national parks now in private hands, Mr. Lee stated. More than $5,000,000 was allocated this year, but more than 490,000 acres of private land are in national parks.

• Science News Letter, 80:137 August 26, 1961

MEDICINE

Arteries More Elastic Up to 20 Than in Aging

➤ AUTOPSIES on 16 males up to 20 years of age, normal at death, showed a "highly significant increase in elastin content" of the aorta, the large trunk artery that carries blood from the heart.

Previous studies lacked adequate statistical data to show why elastin, which supplies the elastic quality of gross arteries, declines during the aging process. Dr. V. Scarselli of the Italian Institute of Biochemistry, Milan, Italy, used a new direct color method for estimating elastin without destructive processes that formerly occurred.

Samples of aortic tissue free from fat accumulations were treated with orcein, a coloring matter prepared by oxidation of orcinol in the presence of ammonia water. All free stain was removed and the stained orceinelastin compound combined with pancreatin. Orceinelastin, "which is brought in this way into solution," Dr. Scarselli reports in Nature, 191:710, 1961, "is then estimated photometrically."

Dr. Scarselli states investigations, in progress in his laboratory, seem to demonstrate a significant decrease of elastin content in aorta after 20 years of age.

• Science News Letter, 80:137 August 26, 1961

TECHNOLOGY

Accelerator Uses Hand-Stitched Cloth

➤ PADS AND WRAPPINGS made up of 25 to 70 layers of glass fiber cloth cut and quilt-stitched together by hand will become an integral part of the 12.5 billion electron volt "atom smasher" under construction at Argonne National Laboratory.

About 200 square yards of this cloth will be used for each of the vacuum transition chambers within the accelerator. The glass fiber material molded and hardened with epoxy resin provides a high-tensile strength, non-magnetic substance that will withstand the very low pressure of the vacuum inside the chamber and normal atmospheric pressure on the outside.

• Science News Letter, 80:137 August 26, 1961

OCEANOGRAPHY

Miniature Instruments Needed for Ocean Study

➤ THE WORLD of miniaturization must come to oceanography in order to adequately explore the oceans.

Compact sophisticated instruments that can be left in the oceans without a ship staying nearby must be developed to chart and explore the huge body of water surrounding the continents. The information gathered would be highly valuable for military and scientific purposes.

An oceanographic network blanketing the oceans is needed to observe the "sub-surface weather." The network already has its counterpart on land where nearly 5,000 U. S. Weather Bureau stations are scattered throughout the United States.

The instruments could be dropped into the oceans by airplane or ships, and information would be telemetered back to a receiving station.

Daily observations from these stations would help fill in the missing links on the ocean's effect on the weather, James M. Snodgrass, Scripps Institution of Oceanography, La Jolla, Calif., reported at a symposium on oceanographic instrumentation in Washington, D. C.

"The pitifully few measurements now taken by the few oceanographic ships that infrequently crisscross the oceans is totally inadequate" the scientist said. "It is just as if the Weather Bureau was given three or four trucks filled with weather gear and then asked to give a true weather picture for the entire United States."

More data at a faster pace are needed for oceanographic research. U. S. industry, world leaders in production and miniaturization, must divert some of its energies towards this goal, Mr. Snodgrass emphasized.

• Science News Letter, 80:137 August 26, 1961

BIOLOGY

Mixture of Amino Acids Checks Blood Ammonia

➤ A MIXTURE of two amino acids has been found to reduce dangerous levels of blood ammonia in laboratory animals.

L-ornithine and L-aspartic acid administered to ammonia-intoxicated rats by two University of Naples scientists resulted in survival of 95% of the animals, it is reported in Nature, 191:705, 1961. Dr. Francesco Salvatore, who is now working at Argonne National Laboratory, Argonne, Ill., in collaboration with Dr. Vincenzo Bocchini, found that injecting aspartic acid alone had almost no effect.

These amino acids have not been tried yet with humans, but L-arginine, another amino acid, classified as essential to the growth of rats, has been successful clinically.

Several investigators have pointed out a relationship between the high levels of blood ammonia and mental disturbances associated with heart failure, tumors and jaundice. In some cases, the scientists state, a reduction in the level of ammonia has reduced these pathological symptoms.

• Science News Letter, 80:137 August 26, 1961

ASTRONOMY

Jupiter Dazzles the Eye

Jupiter is nearly 20 times as bright as a first magnitude star in September. Seen in Sagittarius, the archer, it stands in the south next to Saturn, James Stokley reports.

➤ ONCE AGAIN we have two bright planets in the evening sky.

Jupiter is the more brilliant; shining nearly 20 times as bright as a typical first magnitude star, it is conspicuous in the south in the constellation of Sagittarius, the archer. No star, and no other planet seen at the same time, is as prominent, and this makes it easy to identify. Saturn is a short distance to the right, and in the same constellation. It is considerably fainter, although equal to a bright star of the first magnitude.

Both of these planets, as well as the stars, are shown on the accompanying maps, which depict the skies as they look about ten p.m., your own kind of standard time (add one hour for daylight saving time) on Sept. 1. They appear similarly about nine o'clock at the middle of the month and eight o'clock at the end.

The brightest star of these evenings is seen high in the west. It is Vega, in Lyra, the lyre. Still higher, almost directly overhead for the times of our maps, is Deneb in Cygnus, the swan. Part of this group is shown on the northern sky map, the rest (with Deneb) on the southern. And high in the south, in Aquila, the eagle, is the star called Altair.

Deneb, Altair and Vega are all of the first magnitude, or brighter. In addition, three other first magnitude stars are shown on the maps, but they all are so low that their light is considerably dimmed by the greater thickness of atmosphere it has to penetrate.

Capella Stands Low in Northeast

Low in the northeast is Capella, in Auriga, the charioteer. This will move into a more prominent position in the evening sky during the autumn. Arcturus, in Bootes, the herdsman, is low in the northwest. During the late spring and summer it was more prominent in the evening sky, and now it is about to disappear from view.

And low in the south in Piscis Austrinus, the southern fish, is Fomalhaut, now at about its best position for our latitude, and as high as it ever comes for us. From more southerly countries it rises higher. At Porto Alegre, in southern Brazil, it passes directly overhead.

In the eastern sky you will find Pegasus, the winged horse, and this contains a rather prominent figure, even though the stars are not so bright. This is the "great square," whose regular shape makes it easy to locate. Actually, the northernmost star, called Alpheratz, is not in Pegasus at all. It is in the next-door constellation of Andromeda, which represents the mythological princess who was chained to the rock.

Look toward the north. The great dipper, part of Ursa Major, the great bear, is near the horizon, and poorly placed. But extending upward from it is the long and winding constellation of Draco, the dragon. It winds around Ursa Minor, the lesser bear, of which the pole star, Polaris, is part. And to the other side of Polaris, in the northeast, stands Cassiopeia, the queen. A little higher is Cepheus, the king.

As for the other naked-eye planets, Venus is now visible in the eastern sky, for about two hours before sunrise. Mercury and Mars are too nearly in the same direction as the sun to be visible easily.

In the solar system, as far as we know, there are 31 natural satellites—smaller bodies accompanying planets. Earth has one, Mars two, Jupiter twelve, Saturn nine, Uranus five and Neptune two. None has been discovered attending Mercury, Venus or Pluto.

Our moon is the only satellite visible to the naked eye from earth. Most of the others require rather large telescopes in order to see them. But this is not true for the four larger satellites of Jupiter, which were the first astronomical objects to be discovered after the invention of the telescope in 1610.

It was in January of that year that an Italian astronomer named Galileo Galilei turned his crude little instrument on Jupiter and saw what seemed to be three faint stars nearby. He thought, at first, that these were distant stars that happened to be in about the same direction as Jupiter, and thus were seen in the same part of the sky.

But, as he continued to watch, night after night, these "stars" behaved in a most peculiar way. Sometimes they were on one side of Jupiter, sometimes on the other. One night there were only two, and on another occasion he saw four.

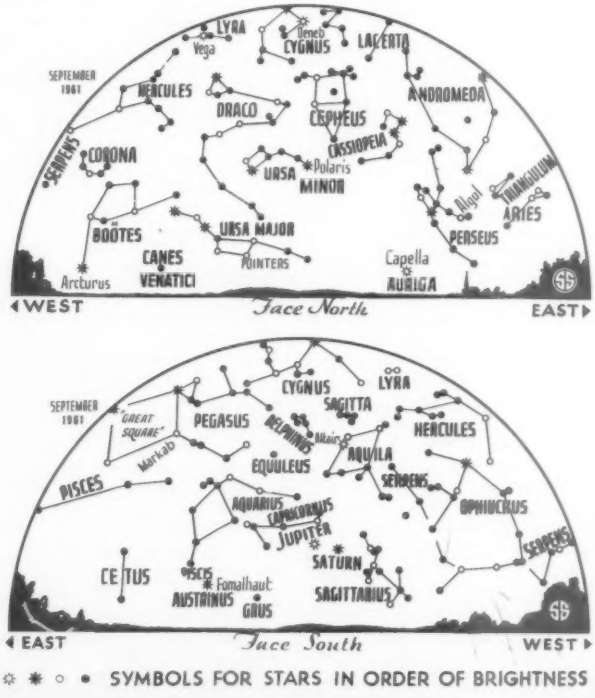
Soon he realized what they were—not stars, but satellites, or "moons," revolving around Jupiter just as the moon revolves about earth. Later they were given names. In order out from the planet, they are Io, Europa, Ganymede and Callisto.

Observe Jupiter's Satellites

You can see these four satellites with a good pair of binoculars, which is a considerably better instrument than Galileo's primitive telescope. They must be held very steady, however, perhaps with your arms resting on some firm support.

Io takes 1 day, 18 hours to revolve around the planet; Europa goes around in 3 days, 13 hours, Ganymede in 7 days, 4 hours, and Callisto in 16 days, 17 hours.

Europa and Callisto are of the sixth magnitude, just at the limit of naked eye visibility with a dark clear sky. Io and Ganymede are of fifth magnitude, enough



to make them visible without a telescope, were they not so close to the bright planet with its overpowering glare.

Because of its rapid revolution, Io changes position rapidly with regard to Jupiter, and Europa a little more slowly. Ganymede and Callisto, for several nights at a time, may be seen on the same side of the planet. Callisto will be to the west from Sept. 3 to 10 and from Sept. 19 to 27. It will be toward the east for the rest of the month. Ganymede will be to the west about Sept. 1, 8, 15, 22 and 29; and to the east around Sept. 4, 11, 19 and 26.

But if you watch these satellites you may find, as Galileo did, that sometimes only three, two or even one is visible. Sometimes they are eclipsed. These moons, like our moon, shine by reflected sunlight, so when they pass into Jupiter's shadow they disappear. Also, they may be occulted, when one goes behind Jupiter. Sometimes, also, a moon passes in front of the planet. Then, also, it is invisible, except with a good-sized telescope. And sometimes, with a telescope, one can see the shadow of a satellite, moving across the planet's disc.

Ganymede and Callisto are the largest of the satellites, each about 3,200 miles in diameter, so they are considerably bigger than our moon, with 2,160 miles. Io, with a diameter of 2,300 miles, is somewhat larger than the moon; Europa, with 2,000 miles, is a little smaller.

Celestial Time Table for September

Sept.	EST	
1	6:06 p.m.	Moon in last quarter
6	7:00 p.m.	Moon passes Venus
7	3:00 p.m.	Moon farthest, distance 252,400 miles
9	9:50 p.m.	New moon
10	1:39 a.m.	Algol (variable star in Perseus) at minimum brightness
12	10:27 p.m.	Algol at minimum
15	7:16 p.m.	Algol at minimum
17	3:24 p.m.	Moon at first quarter
19	5:00 p.m.	Moon passes Saturn
	midnight	Moon passes Jupiter
22	11:00 p.m.	Moon nearest, distance 223,600 miles
23	1:43 a.m.	Sun over equator, autumn commences
24	6:34 a.m.	Full moon
28	5:00 a.m.	Mercury farthest east of sun

Subtract one hour for CST, two hours for MST, and three hours for PST.

Know the Sky to Watch Satellites

These star maps showing the positions of stars and planets can help you locate satellites when they flash briefly across the sky. Familiarity with the constellations and their relative positions makes locating artificial moons much easier whenever they are visible from your area.

• Science News Letter, 80:138 August 26, 1961

Peaches take 140 days to mature, but over half of the total growth occurs during the last 10 days.

The range or endurance of *aircraft* can be extended more than 50% by removing the layer of turbulent air surrounding it in flight.

Androgen, the male sex hormone, is helpful in treating *anemias* associated with certain malignant conditions, decreasing blood transfusion requirements.

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• Books of the Week •

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AMERICAN EDUCATION: Facts, Fancies and Folklore—Raymond P. Harris—*Random House*, 302 p., $5. Discusses the strengths and merits as well as the weaknesses of public education today, from a practising teacher's point of view.

AN ANNOTATED BIBLIOGRAPHY ON THE ACADEMICALLY TALENTED—John C. Gowan—*NEA*, 156 p., paper, $1. Brings together references to articles, reports and books of the past decade.

THE CHILDREN OF SANCHEZ: Autobiography of a Mexican Family—Oscar Lewis—*Random House*, 499 p., $7.50. Anthropologist offers reader insight into low-income Mexican family life by his technique of letting each family member tell his own life story in his own words.

CULTURE WORLDS: Brief Edition—Richard Joel Russell, Fred Bowerman Kniffen and Evelyn Lord Pruitt—*Macmillan*, 476 p., illus., maps, $7.75. Abridged and revised geography text for one-semester course, with more up-to-date maps to serve students as atlas.

CURRENT TEACHING-MACHINE PROGRAMS AND PROGRAMMING TECHNIQUES—Joseph W. Rigney and Edward B. Fry—*AV Communications Review*, May-June 1961 Supplement 3, 122 p., illus., paper, $2. Survey of existing programming techniques to the end of 1960, with description of 81 sample programs.

CURRENT TRENDS IN SCIENTIFIC RESEARCH—Pierre Auger—*Unesco (Int. Doc. Serv.)*, 245 p., $6.75. Survey of the main trends of inquiry in the field of the natural sciences, the dissemination of scientific knowledge and the application of such knowledge to peaceful ends.

ELECTROSTATIC PROPULSION—David B. Langmuir, Ernst Stuhlinger and J. M. Sellen, Jr., Eds.—*Academic Press*, 579 p., illus., $5.75. Selection of technical papers based on a symposium of the American Rocket Society held at U. S. Naval Postgraduate School, Monterey, Calif., November 1960.

ENERGY CONVERSION FOR SPACE POWER—Nathan W. Snyder, Ed.—*Academic Press*, 779 p., illus., $7.25. Selection of technical papers based on a symposium of the American Rocket Society held at Santa Monica, Calif., September 1960.

FACTS ON THE MAJOR KILLING AND CRIPPLING DISEASES IN THE UNITED STATES TODAY, 1961—*National Health Education Committee*, multipaged, illus., paper, $5.25. Bi-annual report in the form of fact sheets and charts on heart diseases, cancer, mental illness, arthritis, blindness, neurological diseases and other health problems.

FIND OUT BY TOUCHING—Paul Showers—*Crowell*, unpaged, illus. by Robert Galster, $2.35. Leads the little child to discover for himself.

FOREIGN DEVELOPMENTS IN MACHINE TRANSLATION AND INFORMATION PROCESSING—V. B. Borshchev and others—*OTS*, 48 p., paper, $1.50. Translations of five USSR Academy of Sciences reports.

GREAT MOMENTS IN MEDICINE—L. J. Ludovici—*Roy Pubs.*, 122 p., illus. by R. J. Payne, $2.50. Human stories about great names in modern medicine, for boys and girls.

INTRODUCTION TO MATRICES AND VECTORS—Jacob T. Schwartz—*McGraw*, 163 p., $5.50. Elementary treatment, suitable for senior high school course in modern algebra.

MAN INTO SPACE—Martin Caidin—*Pyramid Bks*, 192 p., photographs, illus. by Fred L. Wolff, paper, 50¢. The story of Project Mercury including on-the-spot report of Alan Shepard's flight from Cape Canaveral.

THE MEDICINE SHOW: Some Plain Truths About Popular Remedies for Common Ailments—Editors of Consumer Reports—*Simon & Schuster*, 250 p., $3.95. Seeks to give the consumer perspective, an antidote to exaggerated advertising claims, based on 25 years of Consumers Union research.

MONT BLANC AND THE SEVEN VALLEYS—Roger Frison-Roche and Pierre Tairraz, transl. from French by Roland Le Grand—*Oxford Univ. Press*, 267 p., 169 photographs, $9.50. Magnificently illustrated book on Europe's highest mountain peak and the people that live in its valleys.

THE MURRES: Their Distribution, Populations and Biology, a Study of the Genus Uria—Leslie M. Tuck—*Canadian Wildlife Service (Queen's Printer)*, 260 p., photographs, maps, $3; paper, $2.50. Comprehensive study of the large seabird colonies in the North Atlantic region.

NUCLEAR PHYSICS IN PEACE AND WAR—Peter E. Hodgson—*Hawthorn Bks*, 156 p., $3.50. Brief review of the discoveries made in this century about the nucleus of the atom and the effects of these discoveries on the lives of men.

AN OPERATIONS RESEARCH STUDY OF THE DISSEMINATION AND USE OF RECORDED SCIENTIFIC INFORMATION—OR Group, Case Institute of Technology—*OTS*, 63 p., paper, $2. Includes "cost per reading" estimates for the most frequently read scientific journals.

THE OVER FIFTY HEALTH MANUAL: A Guide to a Vigorous and Longer Life for People Over 50—James J. Lally, M.D.—*Prentice-Hall*, 228 p., illus., $4.95. Well organized and illustrated manual designed to help the elderly understand body functions and diseases, and to know when to go to the doctor.

PARASITOLOGY: The Biology of Animal Parasites—Elmer R. Noble and Glenn A. Noble—*Lea & Febiger*, 767 p., illus., $11. General, up-to-date text for the advanced undergraduate student, treating in some detail the ecology and origin of parasitism, parasite-host specificity, and zoogeographical factors.

A PHYSICIAN'S INTRODUCTION TO ELECTRONICS: A Laboratory Manual—A. C. Morris, Jr.—*Pergamon*, 43 p., illus., $2.50. Describes series of experiments demonstrating the basic language of electronics.

PLANET EARTH—Ronald Fraser—*Roy Pubs*, 72 p., photographs, diagrams, $2.95. British scientist summarizes the latest findings of international geophysical exploration, for the layman and young people.

PLANNING FOR EXCELLENCE IN HIGH SCHOOL SCIENCE—National Science Teachers Association—*NSTA*, 67 p., illus., paper, $1. Reexamination of the aims, content and methodology of teaching science in a dynamic society, indicating possible ways of improvement.

THE POLIO MAN: The Story of Dr. Jonas Salk—John Rowland—*Roy Pubs*, 128 p., illus., $3.25. Juvenile biography.

PRINCIPLES OF RESOURCE CONSERVATION POLICY: With Some Applications to Soil and Water Resources—Committee on Soil and Water Conservation of the Agricultural Board—*NAS-NRC*, 50 p., paper, $1.50. Develops analytical framework for appraising conservation and discusses physical, economic and institutional interrelationships in resource conservation, specific problems and recommendations.

• Science News Letter, 80:140 August 26, 1961

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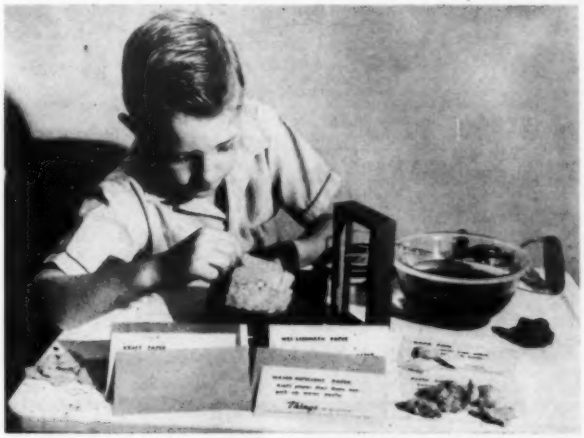

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SOCIOLOGY

Soviets Fight Crime

➤ SOVIET RUSSIA'S CRIME rate has been rising since World War II.

Authorities are striking back with a new "get tough" policy that includes stiffer prison sentences and an increase in the number of crimes punishable by death, the Bulletin of the Institute for the Study of the U.S.S.R., July, 1961, reports.

In May this year, a top-level decree extended the death penalty to include three crimes previously punished by imprisonment. They are embezzling state or public property on a large scale, habitually manufacturing and selling counterfeit money and securities, and terrorizing prison inmates or attacking prison personnel.

The changes, according to Y. Mironenko, spring from a spurt in both criminal and political offenses. Political crimes were called "counterrevolutionary" before 1958 but are now known as "especially dangerous state crimes."

The report quotes Soviet State Procurator-General R. Rudenko, commenting on embezzlement of state property, as saying that "such plunderers, as well as murderers, bandits and counterfeiters, must be punished without mercy, even to the point of shooting them."

The decree admits in effect that dangerous criminals in prison are capable of organizing terrorist groups capable of intimidating other prisoners and even attacking staff members.

Soviet law now allows death by shooting for the three crimes made capital in the May decree, plus treason, espionage, sabotage, terroristic acts, banditry and certain forms of premeditated murders.

The Russians abolished the death penalty in 1947, but restored it in 1950 for treason, espionage and sabotage, adding the other offenses later. Before 1954, a ten-year prison term was the most severe punishment for any form of murder.

Additionally, longer prison terms are being given for many crimes and paroles are becoming harder to get. Judges who do not think prison terms are enough for political prisoners can add two to five years of exile, served at forced labor in distant, sparsely inhabited northern and eastern USSR areas.

There is a parallel drive against "anti-social, parasitic elements" in Soviet society, begun in 1957. If his neighbors or fellow villagers meet and decide he has to go, a man who is not working on the state's behalf—or who is "going through the motions" of work, but actually drawing his income from a private, unapproved source—can be sent into exile for two to five years.

This law is "designed to frustrate the attempts of the Soviet citizen to escape from the clutches of the Soviet economic system," Mr. Mironenko said. "Any attempt to live on one's own is a crime and must be punished."

Reports from the Soviet press indicate the existence of a definite class of professional criminals who have never worked and do not possess a permanent home. Since these "pro's" became adults after the Soviets seized power, their crimes must be regarded as "a social consequence of the Soviet system itself," rather than an outgrowth of pre-revolutionary conditions.

• Science News Letter, 80:142 August 26, 1961

PUBLIC SAFETY

Cars Since 1955 Safer

➤ IF ALL the automobiles on the nation's highways were post-1955 models, about 1,900 lives might be saved each year, Automotive Crash Injury Research of Cornell University, Ithaca, N. Y., has reported.

Improved door locks make the difference. Beginning with 1956 models, manufacturers installed modified latch mechanisms less likely to spring open in an accident. Chances of fatal injuries are higher when an occupant is thrown from the car.

ACIR studied 14,135 American-made automobiles involved in accidents injuring at least one occupant of each vehicle. The cars included 8,606 manufactured before 1955 and 5,529 manufactured since.

Among the later models, researchers found, the frequency at which one or more front doors sprang open was reduced about 33%, the frequency of occupant ejection was reduced about 40%, and the number of dangerous or fatal injuries was reduced about 12%.

They estimate that the modified locks have achieved about 35% of the injury reduction possible if no doors came open at all, and the factor of being thrown from a car in an accident was under complete control. On this basis, the annual saving in lives would total about 5,500 if "perfect" locks were designed and installed in all automobiles.

Deaths in U. S. traffic accidents totaled an estimated 37,800 in 1959, according to the National Safety Council, and an actual 36,981 in 1958, according to the National Office of Vital Statistics.

An earlier study by the Cornell group disproved the widely held theory that being "thrown clear" of a car during an accident improved survival chances. Among persons injured in 3,261 accidents, all involving pre-1956 vehicles, the percentage of fatalities was much higher for those who were "thrown clear" than for those who were not. Deaths reached 12.1% for ejectees, as against 2.5% for non-ejectees.

ACIR also estimates that general use of safety belts could cut traffic deaths by as much as 35%. The belts not only prevent passengers from being thrown from the car, but reduce injuries from being "tossed around" inside.

• Science News Letter, 80:142 August 26, 1961

INVENTION

Patents of the Week

A surface-connected airborne radar system, a high-flying device for prospectors and a drug for treating irregular heart rhythms have been patented.

▶ TO EXTEND the radar horizon so that low-flying aircraft can no longer escape early detection, an airborne radar system, carried in an egg-shaped helicopter tied by a cable to a ground-based generator, has been patented.

Inventor Raymond C. Shreckengost, Silver Spring, Md., received patent No. 2,995,740, and assigned rights to the U. S. Navy.

Run by an electric motor, the twin-bladed helicopter receives its power from the tethering cable. It is equipped with an autopilot capable of holding it at the desired altitude, which should be 1,000 feet or more, and stabilizing it against gusty winds.

The radar antenna is installed in the outer part of the fuselage, and can scan the entire horizon when this outer part is rotated around a stationary central section. Data received are then relayed to a ground station.

Mr. Shreckengost points out that the helicopter, capable of remaining aloft for long time periods, has strong advantages as a radar carrier over fixed-wing aircraft, which cannot stay in the same position, and captive balloons, which become unstable when high winds or icing affect them.

Another airborne device, patented by two British inventors, is designed for use by high-flying prospectors. The idea is to locate ore deposits by measuring the distortion of an electromagnetic field, caused by the ores, while an aerial survey is under way.

An amplifier and other detection equipment are linked to a receiving coil, mounted on one wing-tip of the surveying plane, and a transmitting coil, mounted on the other wing-tip. When disturbances indicating ore deposits below are recorded, the location can be marked on aerial photographs for later investigation by ground searchers.

The apparatus received patent No. 2,995,699, awarded to Eric Charles Snelling, Horley, England, and Peter Doidge Gribble, Old Coulsdon, England. Rights were assigned to the Mullard Radio Valve Company Limited, London.

A new drug compound used in treating irregular heart rhythms, clinically known as cardiac arrhythmia and most commonly present in a condition called atrial fibrillation, is the subject of patent No. 2,995,491. John L. Schmidt, Highland Park, Ill., assigned rights to Abbott Laboratories, North Chicago, Ill.

Mr. Schmidt describes the compound, called 1-(2-diethylaminoethyl)-5-ethyl-5-phenylbarbituric acid, as a non-toxic, white, crystalline, hydrochloride salt, soluble in water. He said it has been found "effective in restoring normal patterns of cardiac contractions."

The compound can be given in injections or in tablet, capsule, powder or flavored liquid form.

Also patented was a child's "stretch" sleeping garment which can be stepped into through a neck opening designed to expand to "several times its normal size." The neck portion is a strip of folded two-way stretch material. A removable elastic band is inserted in the neck strip to assure a snug fit around neck and shoulders.

Inventor Charles E. Bevington, Linfield, Pa., said the garment will "fit persons of several different sizes." He was given patent No. 2,994,884, with rights assigned to National Knitting Company, Royersford, Pa.

An "instructional sky scanner" won patent No. 2,994,971 for Daniel T. Meisenheimer, Milford, Conn., and Louis W. Syarto, Fairfield, Conn. They assigned rights to the A. C. Gilbert Company, New Haven, Conn. The hand-carried device, lit by a battery-powered bulb, holds transparent plates depicting the location of stars and planets, so that the viewer can line up the picture with the actual constellations to learn their names while looking at them.

Patent No. 2,995,633 went to Henry K. Puharich and Joseph L. Lawrence, both of New York, for a hearing aid in the form of a tiny receiver designed to be surgically inserted into a tooth to touch the nerve endings. The user is "able to hear as though through the regular ear system" by sound signals transmitted to the brain through the facial nervous system, the inventors claim.

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Questions

ASTRONOMY—What surface temperatures on Jupiter were suggested by recent experiments? p. 134.

BIOCHEMISTRY—How much of a newly discovered fat was found in animal tissues? p. 131.

PUBLIC HEALTH—Why are football helmets with more "give" recommended? p. 136.

Photographs: Cover, pp. 134 and 135, National Aeronautics and Space Administration; p. 131, The Mead Corporation and Rome Kraft Company; p. 133, U. S. Air Force; p. 144, Casom Corp.

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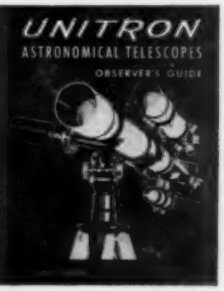

With artificial satellites already launched and space travel almost a reality, astronomy has become today's fastest growing hobby. Exploring the skies with a telescope is a relaxing diversion for father and son alike. UNITRON's handbook contains full-page illustrated articles on astronomy, observing, telescopes and accessories. It is of interest to both beginners and advanced amateurs.

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COMPACT FIRE EXTINGUISHER, cylindrical or ball-shaped with a replaceable shell, for use in homes, autos and boats, is designed for easy one-hand operation and has a rugged full-grip trigger. Containing 2¾ pounds of dry chemical, the charge can be quickly changed by simply unscrewing. A red plastic seal warns of discharge or tampering and a locking device prevents accidental discharge.

• Science News Letter, 80:144 August 26, 1961

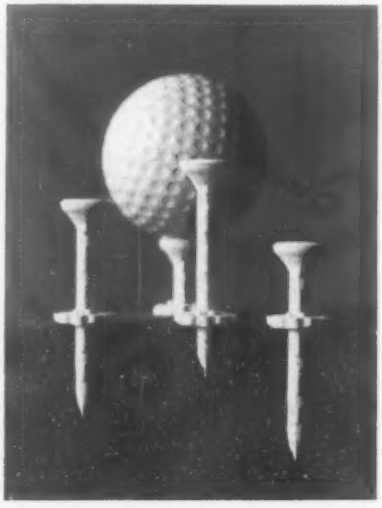
ELECTRIC CAN OPENER operating on fingertip action opens all shapes and sizes of cans, including dented ones. Light and compact, the can opener either stands on its own legs or is mounted on a wall or cabinet. The opener has white, steel case, with gold or chrome finish on plated parts.

• Science News Letter, 80:144 August 26, 1961

CORK EXTRACTOR is a 5¼-inch-long metal, hypodermic-like cylinder with a 1¼-inch needle which removes a bottle cork by injecting a small amount of carbon dioxide from a cartridge into the bottle below the cork. The needle is inserted through the cork, a button pushed and the gas released, lifting out the cork. Extra cartridges are available.

• Science News Letter, 80:144 August 26, 1961

ADJUSTABLE GOLF TEE of tough butyrate plastic enables the golfer to place



the ball at exactly the same elevation for every drive. Each tee, shown in the photograph, is equipped with a detachable collar readily adjustable by a twist to any one of four positions on a notched shaft.

• Science News Letter, 80:144 August 26, 1961

DECORATIVE PLASTIC TRAYS combine beauty and functional utility. Flecks of gold and hand-wrought designs are permanently imbedded in the clear plastic that is durable and resistant to breakage.

• Science News Letter, 80:144 August 26, 1961

DO - IT - YOURSELF ALUMINUM DOOR can be hung in existing door frames with standard woodworking tools and requires no painting or maintenance. The door, 1¾ inches thick and having a core of five-ply laminated wood with an outer skin of aluminum, can be planed, sawed or bored. It is available in different styles, including jalousie and flush doors.

• Science News Letter, 80:144 August 26, 1961

PEEL-A-COLOR PICTURE enables a child to color a picture without crayons or paint. Six different colored sheets of aluminum foil are bonded together to form a nursery rhyme character. To color the figure, pre-cut areas of foil are lifted, a layer at a time, until the desired color is reached. The completed 7-x-9-inch picture can be used as a wall plaque.

• Science News Letter, 80:144 August 26, 1961

IMPACT-RESISTANT CONTAINERS provide maximum protection in shipping electronic and photographic accessories. The tough, plastic case, available in a variety of sizes, has shock absorbing plastic foam inside that holds contents firmly in place. The boxes have high immunity to chemicals and can be steam-sterilized.

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Nature Ramblings

➤ IN THE GREAT western plains and plateaus, one may see the towns of the prairie dogs, complete with mounds and holes. These gregarious rodents have the same elementary social organization that binds other animal groups together.

In the case of the prairie dog, the most notable feature is the posting of sentries that warn of approaching danger by whistling in shrill tones.

If the twitching and bouncing of the prairie dogs are a source of amusement to the occasional observer, they are equally unending annoyances to ranchers.

The little beasts have an insatiable nibbling appetite and do a considerable amount of damage to crops. On the range, a cow, but more frequently a horse, may stumble into a prairie dog hole at the cost of a broken bone.

There is an ancient myth, remarkably persistent in the face of adequate evidence to the contrary, that prairie dogs, burrowing owls and rattlesnakes all live in harmony in the same burrow.

Prairie Dogs

Although it is true that they are frequently found in the same village, it is a fact that owls make their own burrows, or at most pre-empt an abandoned prairie dog hole.

The snakes take advantage of the holes of both owls and prairie dogs. If they are found in the same dwellings with either of them, it may be taken for granted that they are there in intrusion rather than by invitation, for they have been known to eat the young of the prairie dog.

• Science News Letter, 80:144 August 26, 1961

Do You Know?

The cost of *drainage* work on some highway projects approaches a half-million dollars per mile.

A recently designed mechanical *grape harvester* successfully removes more than 95% of the fruit and can do the work of 25 to 40 hand pickers.

Ozone found in smog or polluted air may be responsible for injury to *crops* grown near cities.

A remote control *vehicle* with a hand-like manipulator and four television camera "eyes," has been developed to do the work of a diver on the ocean floor.

An International *Plant Index* of about 50 volumes serving as a master reference of the world's estimated 1,700,000 plants is being compiled with the aid of automatic data-processing equipment for researchers throughout the world.

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